# LDCM Data Specification
# Section 1: LDCM Data and Data Products

*presented by*

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# Spec Re-Organization

## Draft, March 07, 2000

Introduction

1.0 Data Products

2.0 Data Coverage

3.0 Spatial Resolution

4.0 Spectral Coverage

5.0 Geometric Precision, Geolocation, and Cartographic Registration

6.0 Radiometry

## Rev. 1, April 05, 2001

Introduction

1. LDCM Data and Data Products
2. LDCM Spatial Coverage and Temporal Resolution
3. LDCM Spectral Bands
4. LDCM Spatial Resolution
5. LDCM Radiometry
6. Geometric Precision, Geolocation, and Cartographic Registration

# Introduction

- Spec Premise: The LDCM will be required to provide multispectral digital image data affording global coverage of the Earth's land mass on a seasonal basis and in a manner that ensures continuity of the Landsat 7 mission.

- The Spec describes the quantity, content, and qualities of the data and data products required from the LDCM

# Section 1 Reorganization

## Draft Spec

1.1 Level 0 Data Products

1.2 Metadata and Product Associated Files

1.3 Level 1 Data Products

1.4 Level 2 Data Products

1.5 Data Formats

1.6 Ancillary Data

1.7 Data Access and Availability

1.8 Algorithm Documentation

## Rev. 1 Spec

1.1 Archived LDCM Data

1.2 LDCM Data Products

1.3 Cartographic Projections

1.4 Data Product Granules

1.5 Data Product Formats

1.6 Data Product Compression

1.7 Data Product Access and Availability

1.8 Algorithm and Data Product Documentation

# Archived LDCM Data

Draft Spec: **LDCM Data Requirements**

The LDCM mission shall provide multispectral digital image data to a USGS-held archive …

Rev1 Spec: **1.1. Archived LDCM Data**

The LDCM shall archive …

- 1.1.1. Uncorrected LDCM Digital Image Data
- 1.1.2. Ancillary Data
- 1.1.3 Metadata

**The Rev1 Spec no longer presumes, nor does it preclude, a USGS-held LDCM archive**

# Uncorrected LDCM Digital Image Data

## 1.1.1 Uncorrected LDCM Digital Image Data

… those digital image data directly generated by the LDCM sensor(s) and transmitted from the LDCM satellite(s)

### 1.1.1.1 Uncorrected LDCM Digital Image Data Compression

- Lossy compression is precluded
- Lossless compression is not precluded nor is it required

# Archived Ancillary Data and Metadata

## 1.1.2 Ancillary Data

1.1.2.1 Sensor and Satellite Housekeeping Data

1.1.2.2 Pre-Launch Characterization and Calibration Data

1.1.2.3 On-Orbit Characterization and Calibration Data

1.12.4 Supplementary Data

- e.g., ground control point libraries, digital elevation models

## 1.1.3 Metadata

1.1.3.1 Browse Images

**The Rev1 Spec clearly differentiates archived LDCM data from LDCM data products**

# LDCM Data Products

## Draft Spec: 1.0 Data Products

The following data shall be available from the LDCM data archive:

## Rev1 Spec: 1.2 LDCM Data Products

The LDCM shall be capable of producing and distributing the following LDCM data products in accordance with the LDCM Data Policy

# LDCM Data Products

## 1.2 LDCM Data Products

- 1.2.1 Level 0
- 1.2.2 Level 1R
- 1.2.3 Level 1Gs
- 1.2.4 Level 1Gp
- 1.2.5 Level 1Gt

All products are required for the data granules specified in Section 1.4 and in the data formats specified in Section 1.5

# Level 0 LDCM Data Products

## 1.2.1 Level 0 LDCM Data Products

### 1.2.1.1 Level 0 Digital Image Data

- Uncorrected LDCM digital image data

### 1.2.1.2 Level 0 Ancillary Data

- The ancillary data required to generate Level 1Gs Digital Image Data

### 1.2.1.3 Level 0 Metadata

# 1.2.2 Level 1R LDCM Data Products

## 1.2.2.1 Level 1R Digital Image Data

- Radiometrically corrected digital image data that have not been resampled for geometric correction or cartographic registration

## 1.2.2.2 Level 1R Ancillary Data

- Identical to the ancillary data for the corresponding Level 0 Ancillary Data

## 1.2.2.3 Level 1R Metadata

# 1.2.3 Level 1Gs LDCM Data Products

– The LDCM shall be capable of producing Level 1Gs data products for any of uncorrected LDCM digital image data in the LDCM archive

## 1.2.3.1 Level 1Gs Digital Image Data

➢Radiometrically corrected digital image data registered to a selectable cartographic projection (specified in Section 1.3) to the geodetic accuracy specified in Section 6.3 (50 m, 90% circular error), excluding terrain effects

## 1.2.3.2 Level 1Gs Metadata

# 1.2.4 Level 1Gp LDCM Data Products

– The LDCM shall be capable of producing Level 1Gp Data Products for any of the archived LDCM data acquired over the U.S. The LDCM shall have the goal of producing Level 1Gp data products for any of the archived LDCM data

## 1.2.4.1 Level 1Gp Digital Image Data

➢ Radiometrically corrected digital image data registered to a selectable cartographic projection (specified in Section 1.3) to the geodetic accuracy specified in Section 6.4 (10 m, 90% circular error), excluding terrain effects

## 1.2.4.2 Level 1Gp Metadata

# 1.2.5 Level 1Gt LDCM Data Products

– The LDCM shall be capable of producing Level 1Gt Data Products for any of the archived LDCM data acquired over the U.S. The LDCM shall have the goal of producing Level 1Gt data products for any of the archived LDCM data

## 1.2.4.1 Level 1Gt Digital Image Data

➢ Orthorectified, radiometrically corrected digital image data registered to a selectable cartographic projection (specified in Section 1.3) to the geodetic accuracy specified in Section 6.5 (12 m, 90% circular error)

## 1.2.4.2 Level 1Gp Metadata

# Level 2 Data Products

Draft Spec: 1.4 Level 2 data products

Level 2 data products shall consist of atmospherically corrected data products …

Rev1 Spec: Spec's for Level 2 data products deleted

Retained Band 1 (443 nm) and added coarse-resolution water vapor band (Band 12; 940 nm) in Section 3 of Rev1 Spec

## 1.3 Cartographic Projections

- The LDCM shall be capable of producing Level 1G digital image data products registered to the following selectable cartographic projections:
  - Universal Transverse Mercator
  - Lambert Conformal Conic
  - Polar Stereographic
  - Polyconic
  - Transverse Mercator
  - Oblique Mercator
  - Space Oblique Mercator
  - NAD83 State Plane
  - Albers Equal Area
  - Interrupted Goode Homolosine
  - Mercator
  - Equidistant Conic

# LDCM Data Product Granules

## Draft Spec

### 1.7.2 Minimum Data Product Size

The data products produced by the data archive shall have a minimum spatial extent of 8325 $km^2$

### 1.7.3 Maximum Data Product Size

The data products produced by the data archive shall have a maximum time-continuous, along-track spatial extent of at least 12,800 km.

## Rev 1 Spec: 1.4 LDCM Data Product Granules

1.4.1 WRS-2 Scenes

1.4.2 Sub-Scenes

1.4.3 Floating Sub-Interval Products

# 1.4 LDCM Data Product Granules

## 1.4.1 WRS-2 Scenes

- Heritage path/row scene products are specified

## 1.4.2 Sub-Scenes

- Sub-scene products down to a quarter scene are specified

## 1.4.3 Floating Sub-Interval Products

- Products covering an extended area along a WRS-2 path, up to 850 km (TBR), are specified

This spec drives the LDCM towards the heritage Landsat 4 / 5/ 7 orbit

# 1.6 LDCM Data Product Compression

- Uncompressed data products are required. Compressed data products are allowed as an explicitly requested option

# LDCM Product Availability Time

**Draft Spec: 1.7.1 Data Availability Time**

Level 1 Data Products shall be available for ordering from the archive within 48 hours (TBR) of acquisition by the LDCM sensors

**Rev1 Spec: 1.7.1 LDCM Data Product Availability Time**

The LDCM shall provide the capability to search for archived, uncorrected LDCM digital image data within 48 hours (TBR) of LDCM data acquisition by the LDCM sensor(s). The LDCM shall provide the capability to order LDCM Data Products within 48 hours (TBR) of LDCM data acquisition by the LDCM sensor(s).

# Algorithm Documentation

## 1.8 Algorithm and LDCM Data Product Documentation

- Documentation of the algorithms used to produce LDCM data products is required. Documentation of any data compression algorithms applied to the uncorrected LDCM digital image data or to the LDCM data products is required. This documentation shall be available publicly.

# Summary of Major Revisions to Section 1



- **The Rev1 Spec does not presume that the initial LDCM data archive will be USGS-held**
  - Law requires the ultimate transfer of the LDCM archive to the USGS for long term archival
- **The Rev1 Spec differentiates specifications for archived LDCM data from specifications for LDCM data products**
- **The Rev1 Spec does not specify an atmospherically corrected data product**
- **The Rev1 Spec specifies WRS-2 scene products**